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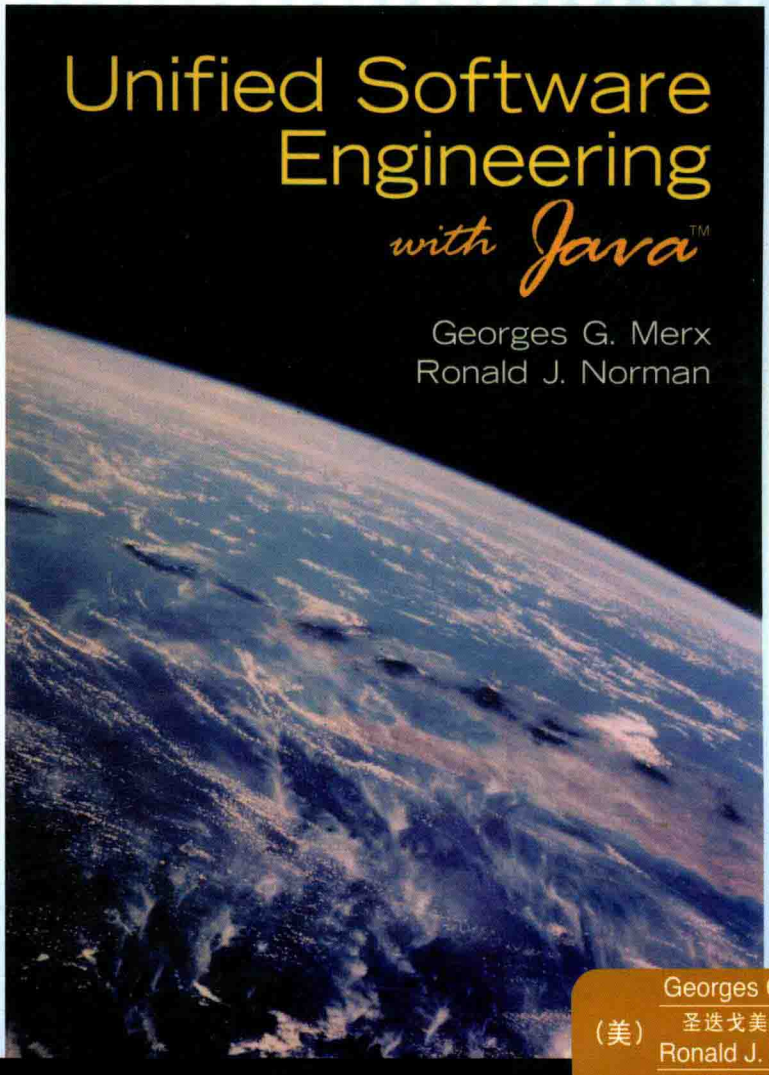
（英文版）



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机械工业出版社
China Machine Press

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（英文版）

Unified Software Engineering with Java

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机械工业出版社
China Machine Press

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出版者的话

文艺复兴以降，源远流长的科学精神和逐步形成的学术规范，使西方国家在自然科学的各个领域取得了垄断性的优势；也正是这样的传统，使美国在信息技术发展的六十多年间名家辈出、独领风骚。在商业化的进程中，美国的产业界与教育界越来越紧密地结合，计算机学科中的许多泰山北斗同时身处科研和教学的最前线，由此而产生的经典科学著作，不仅擘划了研究的范畴，还揭橥了学术的源变，既遵循学术规范，又自有学者个性，其价值并不会因年月的流逝而减退。

近年，在全球信息化大潮的推动下，我国的计算机产业发展迅猛，对专业人才的需求日益迫切。这对计算机教育界和出版界都既是机遇，也是挑战；而专业教材的建设在教育战略上显得举足轻重。在我国信息技术发展时间较短、从业人员较少的现状下，美国等发达国家在其计算机科学发展的几十年间积淀的经典教材仍有许多值得借鉴之处。因此，引进一批国外优秀计算机教材将对我国计算机教育事业的发展起积极的推动作用，也是与世界接轨、建设真正的世界一流大学的必由之路。

机械工业出版社华章图文信息有限公司较早意识到“出版要为教育服务”。自1998年开始，华章公司就将工作重点放在了遴选、移译国外优秀教材上。经过几年的不懈努力，我们与Prentice Hall，Addison-Wesley，McGraw-Hill，Morgan Kaufmann等世界著名出版公司建立了良好的合作关系，从它们现有的数百种教材中甄选出Tanenbaum，Stroustrup，Kernighan，Jim Gray等大师名家的一批经典作品，以“计算机科学丛书”为总称出版，供读者学习、研究及庋藏。大理石纹理的封面，也正体现了这套丛书的品位和格调。

“计算机科学丛书”的出版工作得到了国内外学者的鼎力襄助，国内的专家不仅提供了中肯的选题指导，还不辞劳苦地担任了翻译和审校的工作；而原书的作者也相当关注其作品在中国的传播，有的还专程为其书的中译本作序。迄今，“计算机科学丛书”已经出版了近260个品种，这些书籍在读者中树立了良好的口碑，并被许多高校采用为正式教材和参考书籍，为进一步推广与发展打下了坚实的基础。

随着学科建设的初步完善和教材改革的逐渐深化，教育界对国外计算机教材的需求和应用都步入一个新的阶段。为此，华章公司将加大引进教材的力度，除“计算机科学丛书”之外，对影印版的教材，则单独开辟出“经典原版书库”。为了保证这两套丛书的权威性，同时也为了更好地为学校和老师们服务，华章公司聘请了中国科学院、北京大学、清华大学、国防科技大学、复旦大学、上海交通大学、南京大学、浙江大学、中国科技大学、哈尔滨工业大学、西安交通大学、中国人民大学、北京航空

航天大学、北京邮电大学、中山大学、解放军理工大学、郑州大学、湖北工学院、中国国家信息安全测评认证中心等国内重点大学和科研机构在计算机的各个领域的著名学者组成“专家指导委员会”，为我们提供选题意见和出版监督。

这两套丛书是响应教育部提出的使用外版教材的号召，为国内高校的计算机及相关专业的教学度身订造的。其中许多教材均已为M. I. T.，Stanford，U.C. Berkeley，C. M. U. 等世界名牌大学所采用。不仅涵盖了程序设计、数据结构、操作系统、计算机体系结构、数据库、编译原理、软件工程、图形学、通信与网络、离散数学等国内大学计算机专业普遍开设的核心课程，而且各具特色——有的出自语言设计者之手、有的历经三十年而不衰、有的已被全世界的几百所高校采用。在这些圆熟通博的名师大作的指引之下，读者必将在计算机科学的宫殿中由登堂而入室。

权威的作者、经典的教材、一流的译者、严格的审校、精细的编辑，这些因素使我们的图书有了质量的保证，但我们的目标是尽善尽美，而反馈的意见正是我们达到这一终极目标的重要帮助。教材的出版只是我们的后续服务的起点。华章公司欢迎老师和读者对我们的工作提出建议或给予指正，我们的联系方法如下：

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My wife Jin always supports and encourages my projects—even one as major as writing this book—although they take away from our time together. I am deeply grateful for this irrefutable evidence of true love.

I hope that my efforts will serve to provide some inspiration for my daughter London to find her own path to success, wherever that path may lead her.

A good portion of this work was completed at the Fenton Place Starbucks in San Diego. I express my gratitude to the staff there, and to Starbucks as one of the great American companies, for creating an environment where those of us with short attention spans can be productive.

All the people at Prentice Hall—especially our editor, Tracy Dunkelberger, and her indefatiguable assistant, Christianna Lee—with whom I have had the privilege to work are immensely supportive, helpful, and competent: my appreciation is heartfelt. A special note of appreciation to Irwin Zucker, our production editor, for getting us through the production phase of this project with patience and much good will.

Finally, the indefatigable encouragement and contributions of my co-author, Ron, have been indispensable ingredients to making this project workable.

Georges G. Merx

There are so many to dedicate this book to that I cannot name them individually. Literally hundreds of software engineers (generic title) and academics/researchers around the globe have contributed to making me the professional I am today through the many publications, conferences, seminars, and workshops that I have either physically or virtually attended or led. Their influence has been profound in my life, and I am deeply grateful for the experiences and interaction with each of these professional women and men.

I also dedicate this book to those who will advance their academic and/or professional knowledge through the use of this book. It is truly a privilege to contribute something back to you, since so many individuals have profoundly influenced me.

Thank you, Georges, for allowing me to take this book journey with you—you are a gifted writer and seasoned professional/academic.

Finally, thank you to my life-partner, wife, and best friend: Caralie.

Ronald J. Norman

Preface

Creating commercial software requires excellent knowledge and skills in a number of areas, not just programming language syntax and semantics. We have therefore written a book that teaches the fundamentals of Java programming in the context of object-oriented software engineering and a Unified-Process-based software development methodology. Today's programmers need to be software engineers who knw their languages and tools, certainly, but who also understand object-oriented analysis and design, software quality asurance, and software project management. In fact, the best antidote to the *outsourcing* of software development jobs overseas is to elevate the profession above the specialist tasks of code development. Software engineers need to have the skills to deliver quality software on time, on budget, and according to stakeholder requirements. Our book puts the study of Java in this meaningful, valuable context.

Audience

College students with a previous course in programming or software engineering learning their first or second computer programming language are the primary audience for this textbook. Some previous exposure to principles of information systems and computer science is desirable, but not required. Other likely readers are software development professionals who are looking for a methodical approach to learning object-oriented software development using Java, especially those who only have experience in procedural programming.

Course Definition

This book is recommended for use in information systems or computer science courses at the college level and targets students pursuing an interest in computer science, information systems, or software engineering. In addition to delivering solid programming language instruction, it lays a broad foundation in object-oriented methodology, based on best practices and proven principles developed by Grady Booch, Jim Rumbaugh, Ivar Jacobson, Peter Coad, Barry Boehm, Kent Beck, and other recognized software engineering thought leaders. Based on a complete, object-oriented life-cycle view of the software design and development process, software engineering as defined

and described in this book embraces the use of Java for the development of robust, commercially viable, and eminently usable software solutions.

From initial concept to deployment, all aspects of software engineering project design, development, and management will accompany the students' learning experience. They will understand how rigorous iteration-based requirements management (using stakeholder and use case analysis), conceptual and physical design (using the Unified Modeling Language and Design Patterns), component-based implementation, and well-planned deployment contribute to transitioning software development from an art form to an engineering discipline.

For professors and instructors, this book and accompanying website constitute solid teaching aids, providing not only Java language training, but also work process-based instruction, including a clear and practical introduction to object-oriented design and development. Written with the understanding that the introduction to software engineering and Java can be a daunting experience for many inexperienced readers, this book delivers its instructional content with a strong emphasis on illustrative examples and a firm grounding in real-life applications.

Courses on Java and object-oriented programming are mainstay offerings on many college campuses. This book seeks to support and deepen the interest of students, teachers and administrators in an area of computer science critical to the development of core skills sought after by the high-technology industry. Courses built to leverage the contents of this book will help students advance their understanding of object-oriented software engineering using Java to a level where they can either move on to more advanced course work, or apply their new, practical knowledge in entry-level work positions.

Another Java Book?

The idea for this book arose originally from my search (Merx) for appropriate textbooks for use in my own Java courses. It appeared that available textbooks either focus on Java syntax and structure at the expense of methodology and process, or emphasize "analysis and design," while lacking the practical context of a modern object-oriented programming language and toolset. Both of us have extensive experience both in academia (SDSU, UCSD, Mesa College, University of Phoenix, National University, Grossmont College, and University of Maryland University College) and in business (Borland, TogetherSoft, NCR, AT&T, QUALCOMM, ICL/Fujitsu, etc.). This background convinces us that as educators we need to do better in training our students for the multi-disciplinary effort required to develop valuable, high-quality software that solves difficult problems in a world-class fashion.

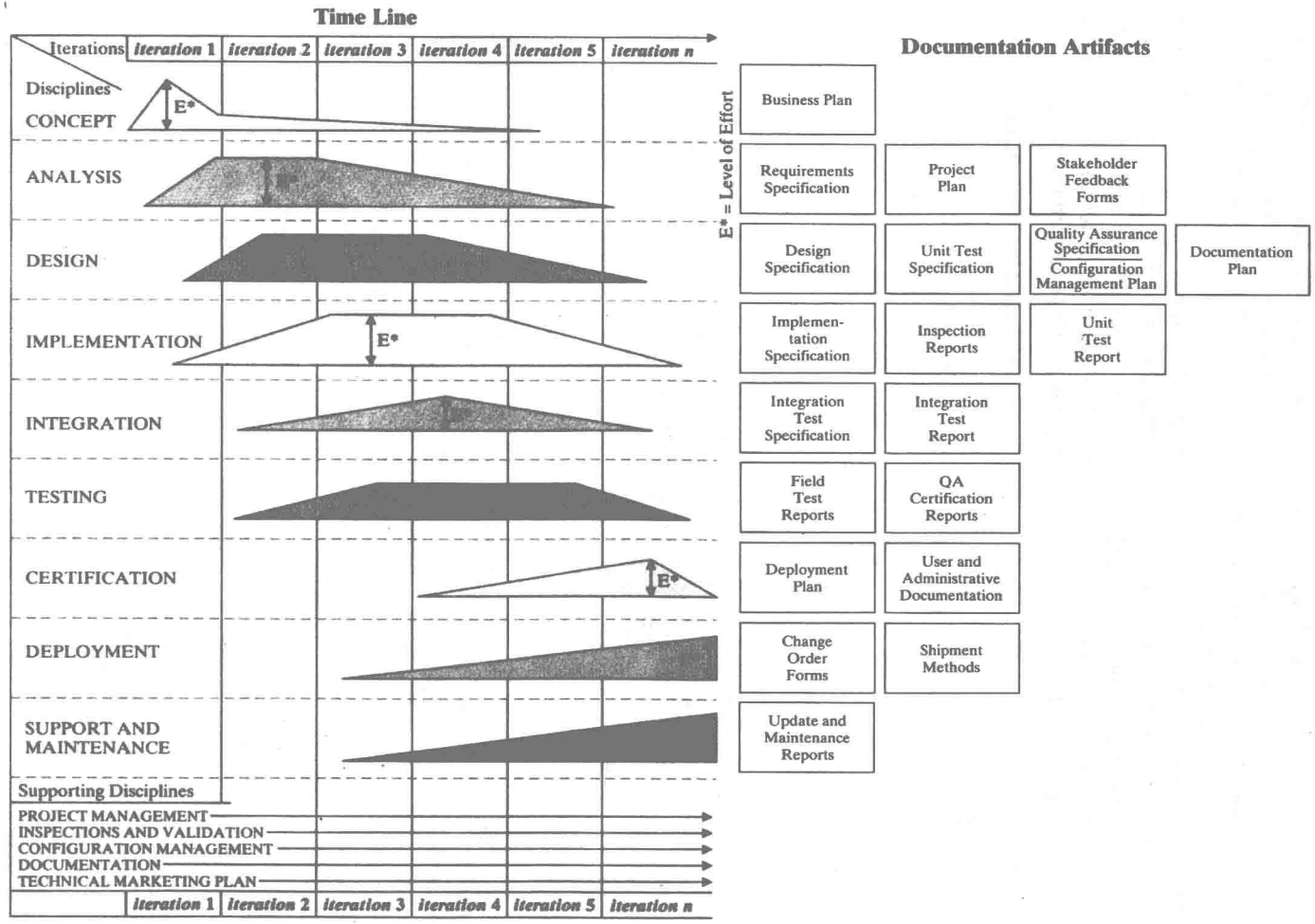
While many excellent text and reference books on Java are available, most are lacking key features deemed essential for practical instruction of effective software engineering using Java. From our perspective, a key area of progress in software development is the recasting of professional programming as a *software engineering discipline*, with its implications of reusability, quality controlled rigor, focus on architecture and process, and project management. Software engineering, as described and standardized in the Carnegie-Mellon University Software Engineering Institute's Capability

Maturity Model, for example, promotes a life-cycle approach to software development projects. The unique features of this book focus on programming language instruction within the framework of a solid, comprehensive, object-oriented methodology, appropriate for implementation in real-world commercial software development projects by inexperienced software engineers.

Both of us have extensive commercial hands-on programming, teaching, and managerial experience in software design and development, architecture, tools, implementation, and project management. Our understanding of industry needs, combined with our teaching experience, have led to this text, which integrates important instructional topics otherwise only available from multiple, unrelated textbooks.

GEORGES G. MERX AND RONALD J. NORMAN

Extended Unified Process Model



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